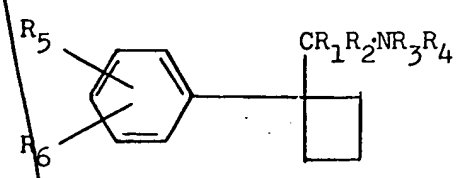
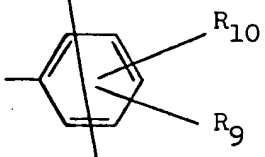
We claim

1) Compounds of formula I



I

in which R_1 is selected from the group consisting of straight or branched chain alkyl groups containing 1 to 6 carbon atoms, cycloalkyl groups containing 3 to 7 carbon atoms, cycloalkylalkyl groups in which the cycloalkyl group contains 3 to 6 carbon atoms and the alkyl group contains 1 to 3 carbon atoms, alkenyl groups containing 2 to 6 carbon atoms, alkynyl groups containing 2 to 6 carbon atoms and groups of formula II



II

in which R_9 and R_{10}, which are the same or different are selected from the group consisting of H, halo and alkoxy groups containing 1 to 3 carbon atoms;

in which R_2 is selected from the group consisting of H and alkyl groups containing 1 to 3 carbon atoms;

in which R_3 and R_4, which are the same or different are selected from the group consisting of H, straight or branched chain alkyl groups containing 1 to 4 carbon atoms, alkenyl groups having 3 to 6 carbon atoms, alkynyl groups having 3 to 6 carbon atoms, cycloalkyl groups in which the ring contains 3 to 7 carbon atoms, and a group of formula CHO or R_3 and R_4 together with the nitrogen atom form an optionally substituted heterocyclic ring having

5 or 6 atoms in the ring optionally containing further hetero atoms in addition to the nitrogen atom;

in which R_5 and R_6, which are the same or different are selected from the group consisting of H, halo, trifluoromethyl, alkyl groups containing 1 to 3 carbon atoms, alkoxy groups containing 1 to 3 carbon atoms, alkylthio groups containing 1 to 3 carbon atoms and phenyl or R_5 and R_6, together with the carbon atoms to which they are attached, form a second benzene ring optionally substituted by at least one halo, alkyl or alkoxy group containing 1 to 4 carbon atoms or the substituents of the second benzene ring together with the two carbon atoms to which they are attached form a further benzene ring;

and their pharmaceutically acceptable salts.

2) Compounds of formula I as claimed in claim 1 in which R_1 is selected from the group consisting of straight or branched chain alkyl groups containing 3 or 4 carbon atoms, cycloalkyl groups containing 3 to 7 carbon atoms, cycloalkylmethyl groups in which the cycloalkyl ring contains 3 to 6 carbon atoms and groups of formula II in which R_9 and R_{10} are selected from the group consisting of H, fluoro or methoxy and in which R_2 is H or methyl.

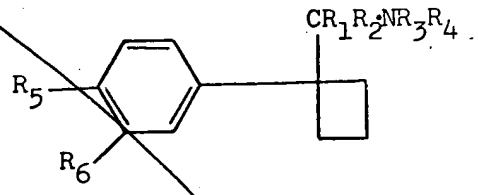
3) Compounds of formula I as claimed in claim 2 in which R_1 is selected from the group consisting of propyl, isopropyl, butyl, isobutyl, secondary butyl, cyclopropyl, cyclobutyl, cyclopentyl, cyclohexyl, cycloheptyl, cyclopropylmethyl, cyclobutylmethyl, cyclopentylmethyl, cyclohexylmethyl and phenyl.

4) Compounds of formula I as claimed in claim 1 in which R_3 and R_4 are selected from the group consisting of H, methyl, ethyl and formyl.

5) Compounds of formula I as claimed in claim 1 in which R_3 and R_4 together with the nitrogen atom to which they are attached form a heterocyclic ring containing one nitrogen atom and 4 or 5 carbon atoms which is optionally substituted by one or more alkyl groups or R_3 and R_4 together with the nitrogen atom to which they are attached form a heterocyclic ring containing a second nitrogen atom which is optionally alkylated or a heterocyclic ring including one or more double bonds.

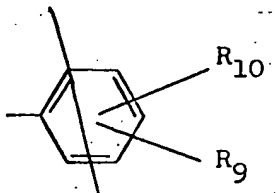
6) Compounds of formula I as claimed in claim 1 in which R_5 and R_6 are selected from the group consisting of H, fluoro, chloro, bromo, iodo, trifluoromethyl, methyl, methoxy and phenyl or R_5 and R_6 together with the carbon atoms to which they are attached form a second benzene ring optionally substituted by halo.

7) Compounds of formula III



III

in which R_1 is selected from the group consisting of straight or branched chain alkyl groups containing 1 to 6 carbon atoms, cycloalkyl groups containing 3 to 7 carbon atoms, cycloalkylalkyl groups in which the cycloalkyl group contains 3 to 6 carbon atoms and the alkyl group contains 1 to 3 carbon atoms, alkenyl groups containing 2 to 6 carbon atoms, alkynyl groups containing 2 to 6 carbon atoms and groups of formula II



II

in which R_9 and R_{10}, which are the same or different are selected from the group consisting of H, halo and alkoxy groups containing 1 to 3 carbon atoms;

in which R_2 is selected from the group consisting of H and alkyl groups containing 1 to 3 carbon atoms;

in which R_3 and R_4, which are the same or different are selected from the group consisting of H, straight or branched chain alkyl groups containing 1 to 4 carbon atoms, alkenyl groups having 3 to 6 carbon atoms, alkynyl groups having 3 to 6 carbon atoms, cycloalkyl groups in which the ring contains 3 to 7 carbon atoms, and a group of formula CHO or R_3 and R_4 together with the nitrogen atom form an optionally substituted heterocyclic ring having 5 or 6 atoms in the ring optionally containing further hetero atoms in addition to the nitrogen atom;

in which R_5 and R_6, which are the same or different are selected from the group consisting of H, halo, trifluoromethyl, alkyl groups containing 1 to 3 carbon atoms, alkoxy groups containing 1 to 3 carbon atoms, alkylthio groups containing 1 to 3 carbon atoms and phenyl or R_5 and R_6, together with the carbon atoms to which they are attached, form a second benzene ring optionally substituted by at least one halo, alkyl or alkoxy group containing 1 to 4 carbon atoms or the substituents of the second benzene ring together with the two carbon atoms to which they are attached form a further benzene ring;

and their pharmaceutically acceptable salts.

8) Compounds of formula III as claimed in claim 7 in which R_1 is selected from the group consisting of straight or branched chain alkyl groups containing 3 or ~~1 to~~ 4 carbon atoms, cycloalkyl groups containg 3 to 7 carbon atoms, cycloalkylmethyl groups in which the cycloalkyl ring contains 3 to 6 carbon atoms and groups of formula II in which R_9 and R_{10} are selected from the group consisting of H, fluoro or methoxy and in which R_2 is H or methyl.

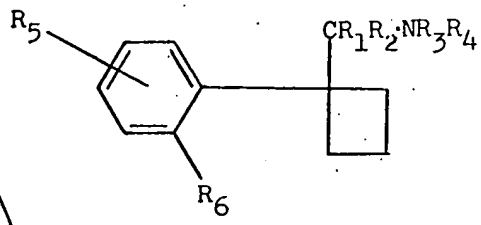
9) Compounds of formula III as claimed in claim 7 in which R_1 is selected from the group consisting of ~~methyl, ethyl,~~ propyl, isopropyl, butyl, isobutyl, secondary butyl, cyclopropyl, cyclobutyl, cyclopentyl, cyclohexyl, cycloheptyl, cyclopropylmethyl, cyclobutylmethyl, cyclopentylmethyl, cyclohexylmethyl and phenyl.

10) Compounds of formula III as claimed in claim 7 in which R_3 and R_4 are selected from the group consisting of H, methyl, ethyl and formyl.

11) Compounds of formula III as claimed in claim 7 in which R_3 and R_4 together with the nitrogen atom to which they are attached form a heterocyclic ring containing one nitrogen atom and 4 or 5 carbon atoms which is optionally substituted by one or more alkyl groups or R_3 and R_4 together with the nitrogen atom to which they are attached form a heterocyclic ring containing a second nitrogen atom which is optionally alkylated or a heterocyclic ring including one or more double bonds.

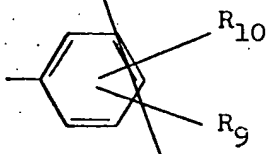
12) Compounds of formula III as claimed in claim 7 in which R_5 and R_6 are selected from the group consisting of H, fluoro, chloro, bromo, iodo, trifluoromethyl, methyl, methoxy and phenyl or R_5 and R_6 together with the carbon atoms to which they are attached form a second benzene ring optionally substituted by halo.

13) Compounds of formula IV



IV

in which R_1 is selected from the group consisting of straight or branched chain alkyl groups containing 1 to 6 carbon atoms, cycloalkyl groups containing 3 to 7 carbon atoms, cycloalkylalkyl groups in which the cycloalkyl group contains 3 to 6 carbon atoms and the alkyl group contains 1 to 3 carbon atoms, alkenyl groups containing 2 to 6 carbon atoms, alkynyl groups containing 2 to 6 carbon atoms and groups of formula II



II

in which R_9 and R_{10}, which are the same or different are selected from the group consisting of H, halo and alkoxy groups containing 1 to 3 carbon atoms;

in which R_2 is selected from the group consisting of H and alkyl groups containing 1 to 3 carbon atoms;

in which R_3 and R_4, which are the same or different are selected from the group consisting of H, straight or branched chain alkyl groups containing 1 to 4 carbon atoms, alkenyl groups having 3 to 6 carbon atoms, alkynyl groups having 3 to 6 carbon atoms, cycloalkyl groups in which the ring contains 3 to 7 carbon atoms, and a group of formula CHO or R_3 and R_4 together with the nitrogen atom form an optionally substituted heterocyclic ring having

5 or 6 atoms in the ring optionally containing further hetero atoms in addition to the nitrogen atom;

in which R_5 is selected from the group consisting of H, halo, trifluoromethyl, alkyl groups containing 1 to 3 carbon atoms, alkoxy groups containing 1 to 3 carbon atoms, alkylthio groups containing 1 to 3 carbon atoms and phenyl;

in which R_6 is fluoro or methyl;

and their pharmaceutically acceptable salts.

14) Compounds of formula IV as claimed in claim 13 in which R_1 is selected from the group consisting of straight or branched chain alkyl groups containing 1 to 4 carbon atoms, cycloalkyl groups containing 3 to 7 carbon atoms, cycloalkylmethyl groups in which the cycloalkyl ring contains 3 to 6 carbon atoms and groups of formula II in which R_9 and R_{10} are selected from the group consisting of H, fluoro or methoxy and in which R_2 is H or methyl.

15) Compounds of formula IV as claimed in claim 13 in which R_1 is selected from the group consisting of methyl, ethyl, propyl, isopropyl, butyl, isobutyl, secondary butyl, cyclopropyl, cyclobutyl, cyclopentyl, cyclohexyl, cycloheptyl, cyclopropylmethyl, cyclobutylmethyl, cyclopentylmethyl, cyclohexylmethyl and phenyl.

16) Compounds of formula IV as claimed in claim 13 in which R_3 and R_4 are selected from the group consisting of H, methyl, ethyl and formyl.

17) Compounds of formula IV as claimed in claim 13 in which R_3 and R_4 together with the nitrogen atom to which they are attached form a heterocyclic ring containing one nitrogen atom and 4 or 5 carbon atoms which is optionally substituted by one or more alkyl groups or R_3 and R_4 together with the nitrogen atom to which they are attached form a heterocyclic ring containing a second nitrogen atom which is optionally alkylated or a heterocyclic ring including one or more double bonds.

18) Compounds of formula IV as claimed in claim 13 in which R_5 is selected from the group consisting of H, fluoro, chloro, bromo, iodo, trifluoromethyl, methyl, methoxy and phenyl.

19) A pharmaceutical composition comprising a therapeutically effective amount of a compound of formula I as claimed in claim 1.

20) A pharmaceutical composition comprising a therapeutically effective amount of a compound of formula III claimed in claim 7.

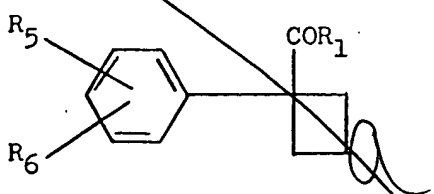
21) A pharmaceutical composition comprising a therapeutically effective amount of a compound of formula IV claimed in claim 13.

22) A pharmaceutical composition as claimed in claim 19 in unit dosage form.

23) A pharmaceutical composition as claimed in claim 20 in unit dosage form.

24) A pharmaceutical composition as claimed in claim 21 in unit dosage form.

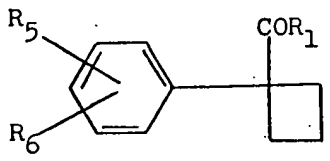
25) A process for the preparation of compounds of formula I comprising the reductive amidation of ketones of formula V



V

to give compounds in which R_3 = H, R_4 = CHO and R_1, R_5 and R_6 are as defined above.

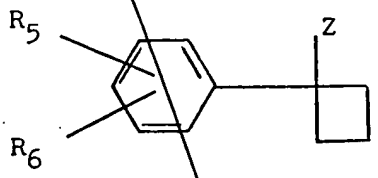
26) A process for the preparation of compounds of formula I comprising reductive amination of ketones of formula V



V

to give compounds in which R_2 = H and R_1, R_5 and R_6 are as defined above.

27) A process for the preparation of compounds of formula I comprising the reduction of compounds of formula VI



VI

in which

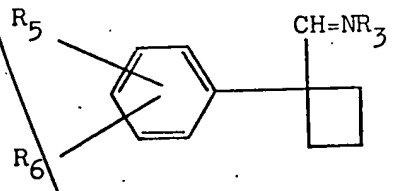
a) Z is a group of formula $-CR_1=NOH$ or an ester or ether thereof to give compounds of formula I in which R_2, R_3 and R_4 are H;

b) Z is a group of formula $-CR_1=NR_3$ to give compounds of formula I in which R_2 and R_4 are H;

c) Z is a group of formula $-CR_1R_2NY$ in which Y represents a metal-containing moiety derived from an organometallic reagent to give compounds of formula I in which R_2, R_3 and R_4 are H;

28) A process as claimed in claim 27 in which Y is MgBr or Li.

29) A process for the preparation of compounds of formula I comprising (a) the reaction of an organometallic reagent with imines of formula VII

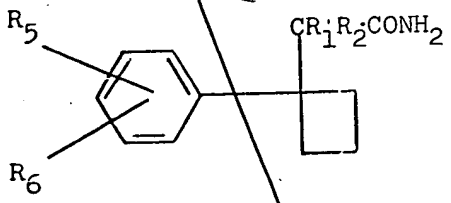


VII

and (b) the hydrolysis of the resulting products to give compounds of formula I in which R_2 and R_4 are H.

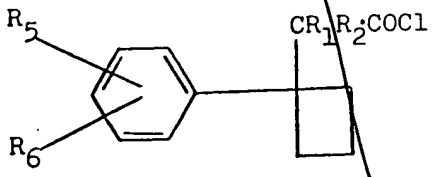
30) A process as claimed in claim 29 in which the organometallic reagent is a Grignard reagent of formula R_1MgBr or an organolithium compound of formula R_1Li.

31) A process for the preparation of compounds of formula I comprising the decarboxylative rearrangement of (a) amides of formula VIII



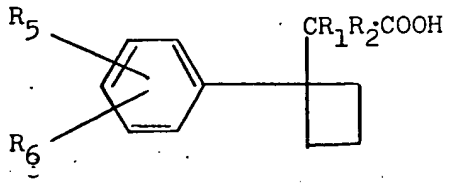
VIII

and (b) acyl azides formed by reaction of sodium azide with acid chlorides of formula IX



IX

32) A process for the preparation of compounds of formula I comprising the reaction of hydrazoic acid with carboxylic acids of formula X



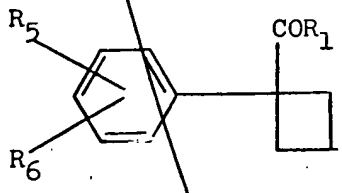
X

33) A process for the preparation of compounds of formula I in which R_4 is H comprising the hydrolysis of compounds of formula I in which R_4 is CHO.

34) A process for the preparation of compounds of formula I in which R_4 is methyl comprising the reduction of compounds of formula I in which R_4 is CHO.

35) A process for the preparation of compounds of formula I in which one or both of R_3 and R_4 is other than H comprising the conversion of a compound of formula I in which one or both of R_3 and R_4 are hydrogen to the required compound.

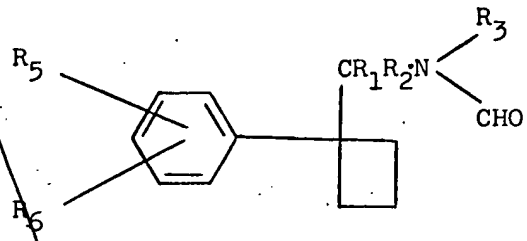
36) Compounds of formula V



V

in which R_1, R_5 and R_6 are as defined above with the proviso that when R_1 is methyl or ethyl R_5 is other than H.

37) Compounds of formula XIX



XIX

in which R_1, R_2, R_3, R_5 and R_6 are as defined in claim 1.

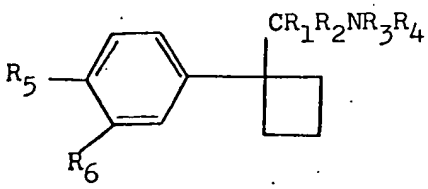
38) Compounds of formula XII disclosed herein as novel compounds.

39) A method of treating depression which comprises administering to a depressed patient a therapeutically active amount of a compound of formula I.

40) A method of treating depression which comprises administering to a depressed patient a therapeutically active amount of a compound of formula III.

41) A method of treating depression which comprises administering to a depressed patient a therapeutically active amount of a compound of formula IV.

42) Compounds of formula III



III

in which R_1 is selected from the group consisting of ~~methyl~~, propyl, isobutyl and phenyl; R_2 is H; R_3 is H, methyl or ethyl; R_4 is H, methyl or ethyl; R_5 is chloro; R_6 is H or chloro and their pharmaceutically acceptable salts.

43) Compound of claim 42, which is 1-[1-(4-chlorophenyl)cyclobutyl]butylamine and its pharmaceutically acceptable salts.

44) Compound of claim 42, which is N,N-dimethyl-1-[1-(4-chlorophenyl)cyclobutyl]butylamine and its pharmaceutically acceptable salts.

45) Compound of claim 42, which is N-methyl-1-[1-(3,4-dichlorophenyl)cyclobutyl]butylamine and its pharmaceutically acceptable salts.

46) Compound of claim 42, which is N,N-dimethyl-1-[1-(3,4-dichlorophenyl)cyclobutyl]butylamine and its pharmaceutically acceptable salts.

47) Compound of claim 42, which is N-methyl-1-[1-(4-chlorophenyl)cyclobutyl]-3-methylbutylamine and its pharmaceutically acceptable salts.

48) Compound of claim 42, which is N,N-dimethyl-1-[1-(4-chlorophenyl)cyclobutyl]-3-methylbutylamine and its pharmaceutically acceptable salts.

49) Compound of claim 42, which is N,N-dimethyl-1-[1-(3,4-dichlorophenyl)cyclobutyl]-3-methylbutylamine and its pharmaceutically acceptable salts.

~~50) 1-[1-(3,4-dichlorophenyl)cyclobutyl]ethylamine and its pharmaceutically acceptable salts.~~

51) N,N-dimethyl-1-[1-(3,4-dichlorophenyl)cyclobutyl]-ethylamine and its pharmaceutically acceptable salts.

52) ~~α-[1-(4-chlorophenyl)cyclobutyl]benzylamine~~ compound of claim 42, which is α-[1-(4-chlorophenyl)cyclobutyl]benzylamine and its pharmaceutically acceptable salts.